



The  
Cambridge-MIT  
Institute

# CMI Goals & Assessment

---

26 June 2004

- To demonstrate the return on investment by HMG
- To improve the CMI program, and maximize its current and future value
- To identify replicable models, and provide convincing evidence of their success to support further adoption (and to learn from failure)
- To produce an assessment framework for future programs similar to CMI

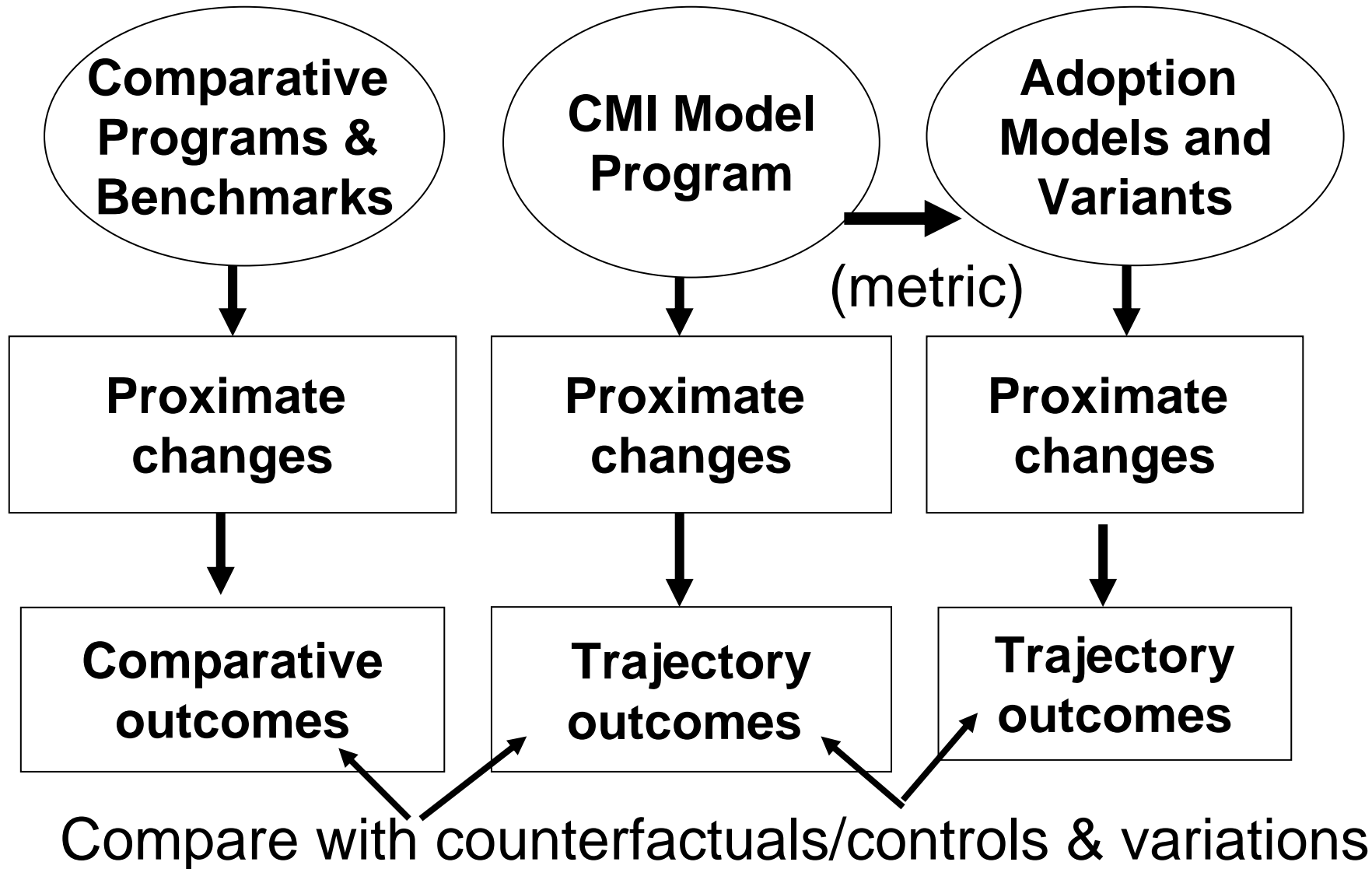
# Models and Networks

---

- Model identification – Key to CMI strategy
  - Promise of significant effects
  - Supported by research on why successful
  - Associated with network to take it forward
- New CMI start or pre-existing UK programme
- Measurement of proximate effects
  - Specify theoretically important elements
  - If no proximate effects, type of failure is isolated
- Measurement of trajectory outcomes
  - Elements that link to outcomes enable program improvement, strengthen assertion of causation
- Comparison and adoption assessment

# CMI Assessment Methodology

---

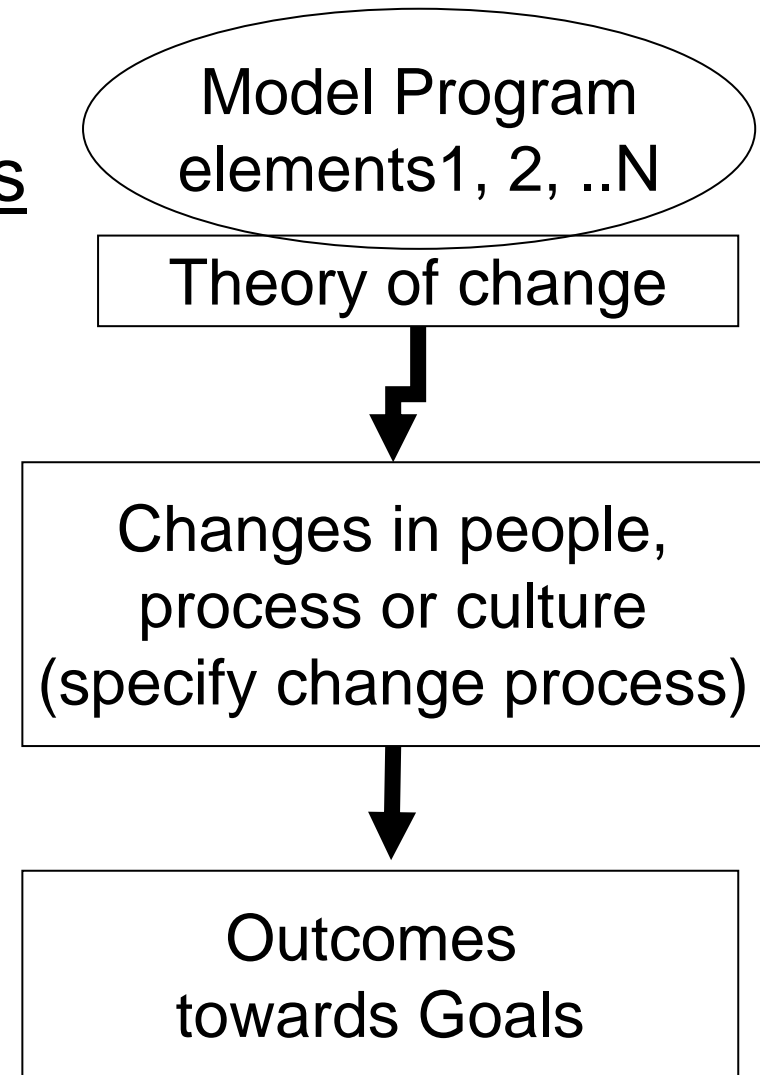


# Theory-based Assessment

---

Strong assessment sees programmes as multiple vitamins

- Government programmes are often wildly variable
- After success, still difficult to know what to require
- Theory helps focus on what to measure
- Supports sets of standard measures
- Assessment can then ask why change occurs; test theory



# For Entrepreneurship Event

---

H<sub>1</sub> Experiential learning, reflection, and modeling on successful individuals (like the student)

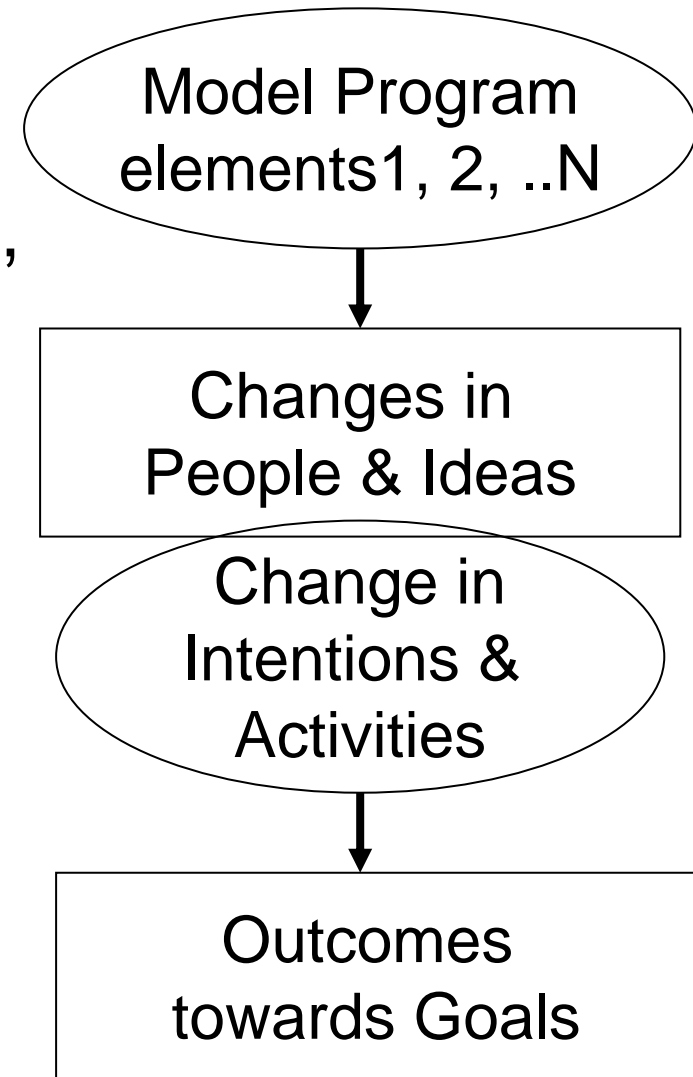
→ Increased entrepreneurial self-efficacy (not intent)

→ Increased pre-entrepreneurial behavior (trajectory metric)

H<sub>2</sub> Long term: Self-efficacy & pre-entrepreneurial behavior

→ Increase participation in entrepreneurial firms

→ Increase choice of higher risk firms



# Entrepreneurial self-efficacy after 6 months

A. <u>Self-efficacy</u> :	Skill “Good” to “Excellent”		Sign test
Response rate 50.9, N=28	Pre-Event	After 6 months	Z value
Work on collaborative projects as a member of a team.	85.2%	85.2%	1.069
Ask probing questions that clarify facts.	61.5%	80.8%	1.807*
Recognise a good opportunity.	70.4%	74.1%	2.524*
Motivate others to work together.	59.3%	74.1%	3.153***
Lead a group whose members disagree.	37.0%	63.0%	3.500***
Deliver on a job you have agreed to do.	88.9%	92.6%	1.213
Understand what it takes to start your own business.	19.2%	76.9%	4.264***
Start a successful business if you want.	22.2%	59.3%	3.578***

- Team member & other skills already high in self-selected group
- Confidence in leadership skill improvement one key
- Understanding how, and the confidence to start a company
- Multiple events to build empirical base, allow variation

# Entrepreneurial behaviors after 6 months

---

C. <u>Entrepreneurial Awareness</u> Often defined as 6+ times a month	Percent saying “Often”	Sign test	
Talked about an idea for starting a Company.	28.6%	39.3%	0.688
Pursued an idea for starting a company talking about it more than once.	14.3%	28.6%	1.414*
Took steps (e.g., looked into markets or technology) to follow up on an idea.	7.1%	25.0%	1.941*

\* p<.05; \*\*p<.01; \*\*\*p<.001.

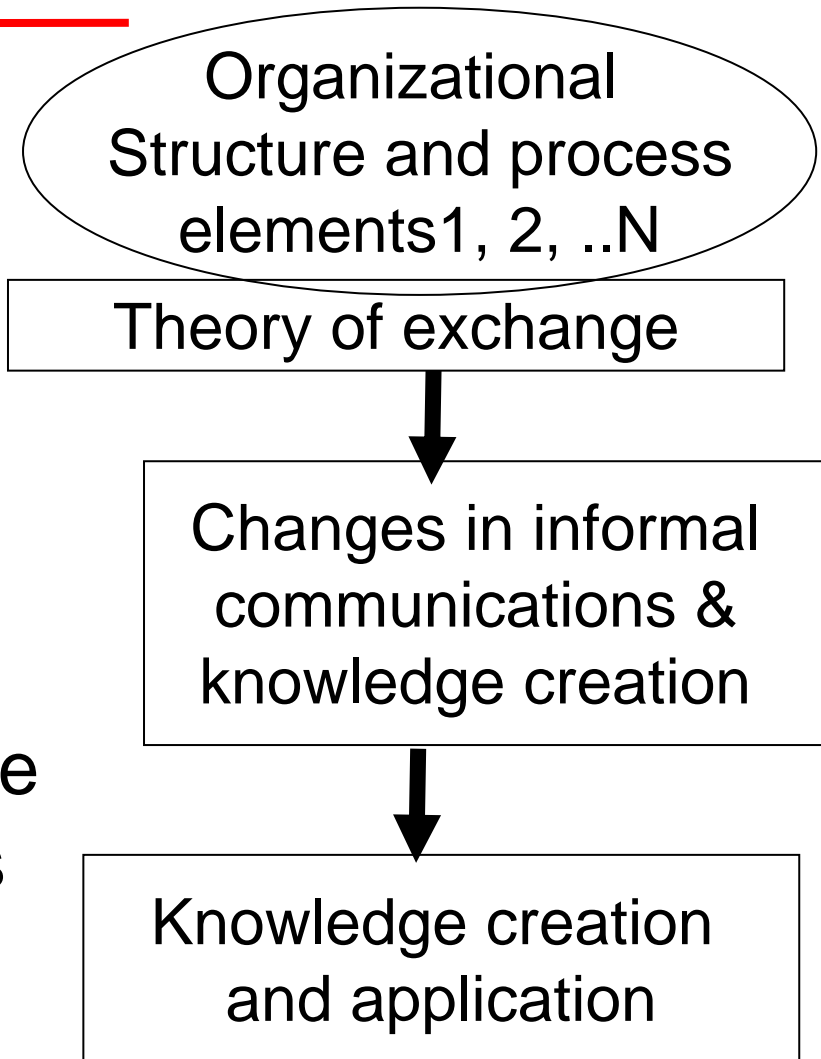
- Talking about ideas increased, not significantly
- Repeated talking about an idea, levels doubled
- Active steps, cusp of entrepreneurship, tripled
- Change correlated with identified elements

# Proximate Process Variable for Knowledge Exchange Assessment

---

## KEx as cross-boundary communications

- 35 year old literature
- Key informal inter-personal technical communications cross-boundary communications processing model
- Embedded (tacit) knowledge
- Universities and companies as communities of practice
- Exchange difficulty function of language & practice divergence



# Underlying assumptions about knowledge transfer

---

- We all have mental models that we use to organize and make sense of information.
- We each tend to organize what we see in terms of our pre-existing models.
- Different people and communities of practice have different shared mental models, leading to different interpretations. *Miscommunication.*
- The more divergent the purposes and practices, the more creativity and effective knowledge transfer both require disciplined *focus and sustained informal reiteration of ideas.*

# LeanTEC Research for Boeing and US Air Force

---

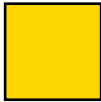
- Occasional mention that over-commitment hurts teams.
  - Less attention to detail, engagement, & buy-in
  - Limits solution search when task gets messy
- Specialist should participate on team
  - Was it the right question? Need for context.
  - What unspoken assumptions are in answer?
  - Commitment to a team solution.


# Knowledge Exchange within the Firm


---

## Measuring the practice of staffing

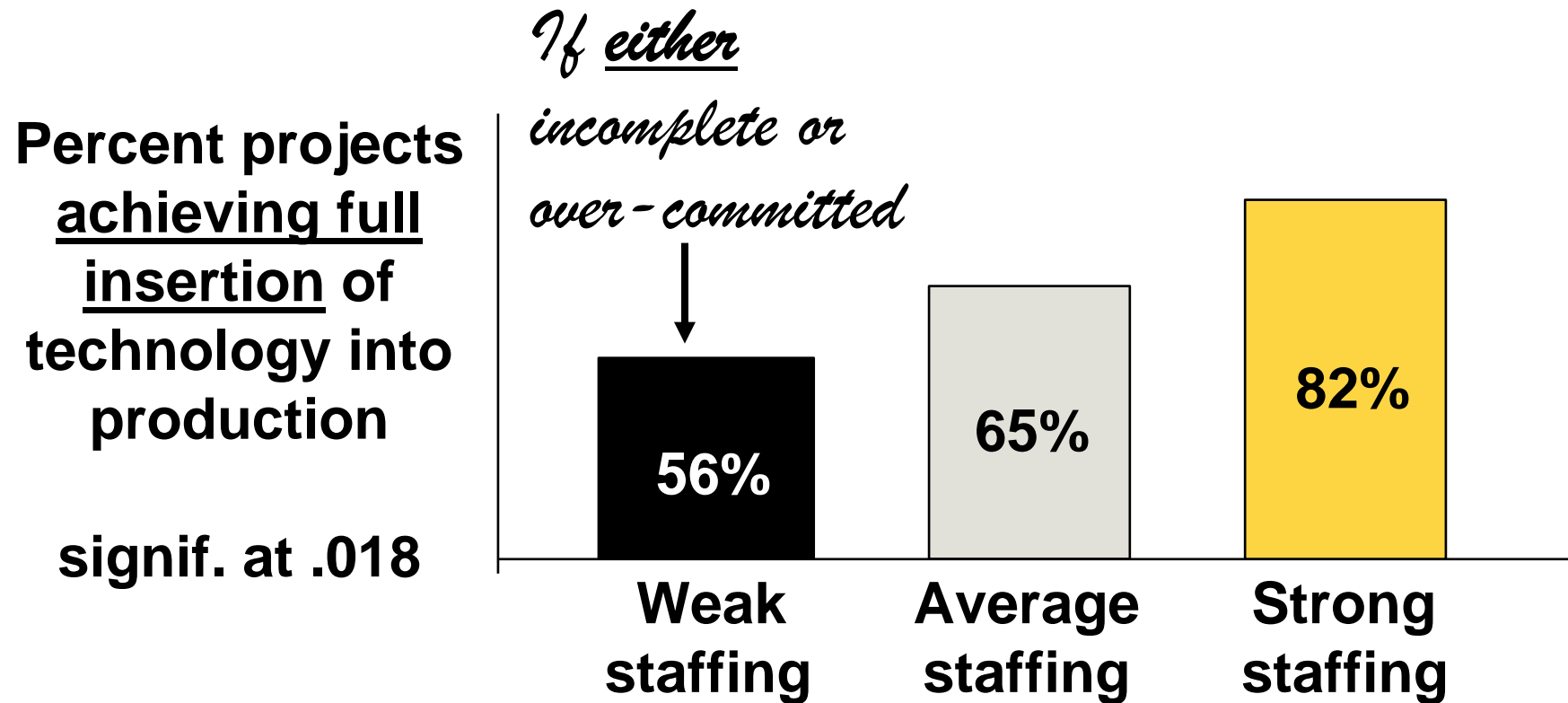
Paid team member interviews, 50% response  
300 projects transitioning new technology

Strong:  Project informants on project sure that all key skills were represented on the team, & members not on too many tasks & teams.

Average:  Team seemed to have all key skills, and also seemed not to be over-committed.

Weak:  May have full representation of key skills, AND/OR may not be over-committed.

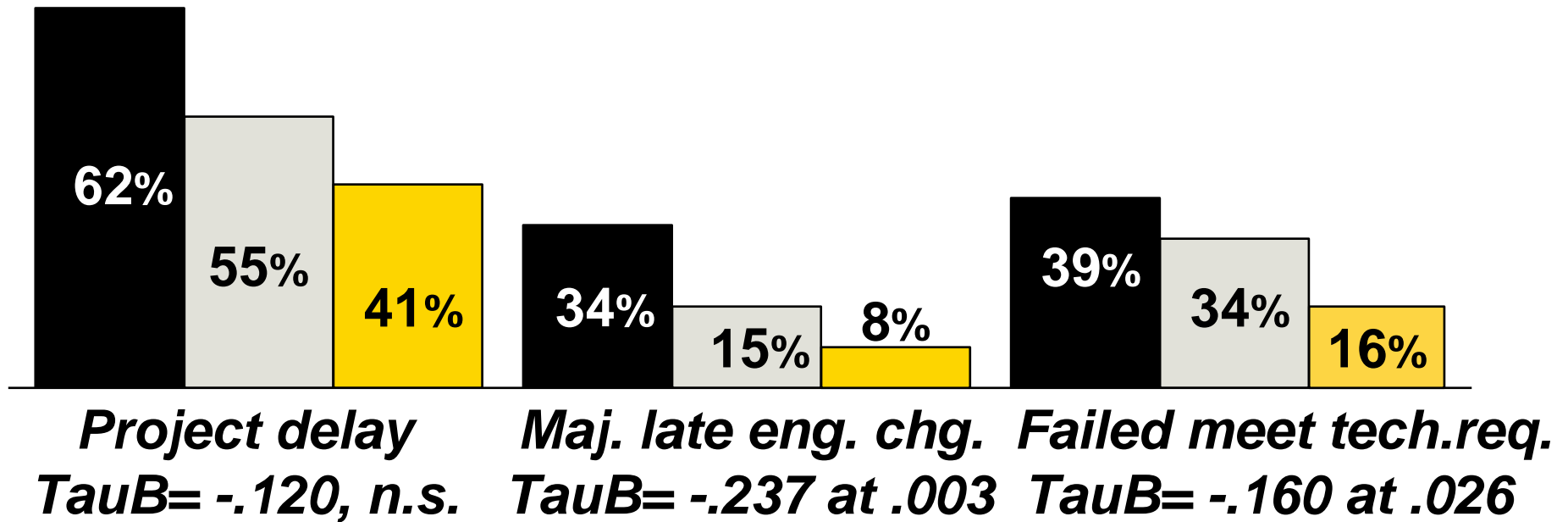
# Staffing-in-practice and Project Success in Technology Transition



***FULL REPRESENTATION OF KEY SKILLS AND AVOIDING OVER-COMMITMENT RELATES TO SUCCESSFUL TECHNOLOGY IMPLEMENTATION***

# Staffing-in-practice and the Project Outcomes

Only for projects that achieved technology insertion



**FULL REPRESENTATION OF BOTH KEY SKILLS & NO OVER-COMMITMENT RELATES TO AVOIDING DELAY, AVOIDING LATE ENGINEERING CHANGES, MEETING REQUIREMENTS**

# Staffing & Lean Development

---

For projects that achieved technology insertion

**Index of Quality of Transition**

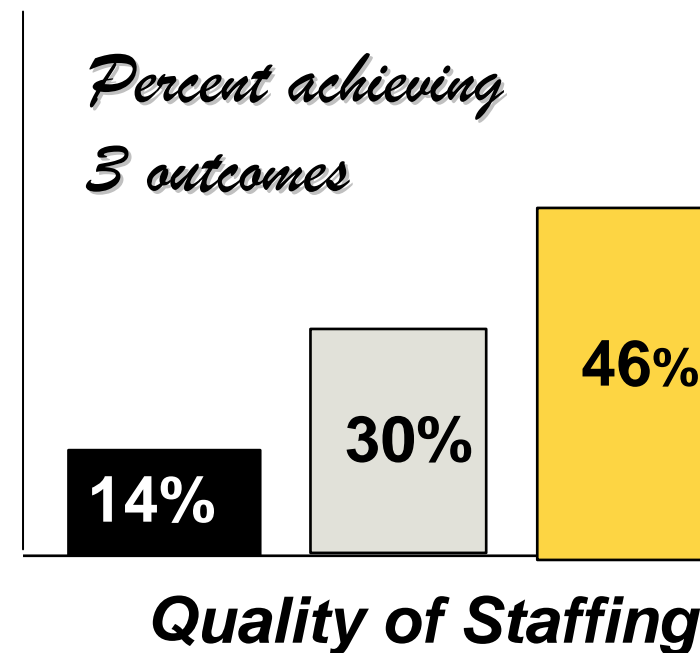
**Project on time = 1**

**No/minor late eng.change = 1**

**Met tech. requirements = 1**

**Lean Score  $\frac{1}{3}$**

$N=123, \text{ TauB} = .201 \text{ at } .007$



**EVERY SENIOR MANAGER IN THE COMPANIES  
STUDIED THOUGHT STAFFING PRACTICES WERE  
ADEQUATE**

# Lessons for KEx assessment

---

- A priori, no reason to think U-I knowledge (just another form of cross-boundary communications) is easier or different human process
  - The more divergent the goals, embedded practices, and language, the greater the difficulty
  - Corollary: biology easier than engineering
- An unspecified amount of the variance in knowledge exchange results from organizational practice below the level of the business unit
- Management may not be able to report reliably on those practices.